REMARKS

Claims 7-11 and 13 are pending in the above referenced application and have been examined on their merits in the Office Action dated March 20, 2009. In the Office Action, the Examiner claims 7 and 8 under 35 U.S.C. §102(b), and claims 7-11 and 13 are rejected under 35 U.S.C. §103(a). The rejections set forth in the Official Action have been overcome by amendment or are traversed by argument below.

In the Claims, the Applicant has amended claims 7, and 9-11. Claims 15-21 have been newly added herein. No new matter has been added as a result of the amendments.

Support for the amendments to **claim 7** can be found in the original disclosure for instance on page 11, lines 24-27; page 4, line 27, page 5, line 4, and page 10 lines 15-25; and page 12, lines 22-25. Support for the amendment to **claims 9 and 10** can also be found in the original disclosure, for instance in FIG. 5. Support for the amendment to **claim 11** is in the original disclosure, for instance on page 69 lines 15-18, page 69 lines 18-20, and FIG. 12. Support for the **new claims 15 and 16** is disclosed in the application on page 14, lines 7-12. Support for the **new claims 17-20** can be found in the application on page 16 lines 1-6 and lines 17-25, and page 19, lines 8-18. Finally, support for **new claim 21** can be found in previously presented claim 7 and also in the original disclosure on page 12 lines 17-21, and FIG. 3.

The amendments to these claims can be viewed in the Amendments section in the Listing of Claims beginning on page 3 of this paper.

PAGE 8/18 * RCVD AT 9/10/2009 4:42:59 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/9 * DNIS:2738300 * CSID:312 427 6663 * DURATION (mm-ss):03-24

Rejection of Claims 7 and 8 under 35 U.S.C. §102(b).

The Examiner rejected claims 7 and 8 under 35 U.S.C. §102(b) as being anticipated by Singhvi (U.S. 6,368,838) or Spargo (Spatially Controlled Adhesion, Spreading, and Differentiation of Endothelial cells on Self-assembled Molecular Monolayers, PNAS 1999, 91(23), 11070-11074) or Koichi (JP 2003-009870).

The Applicant respectfully disagrees.

To anticipate a claim, each and every element of that claim must be taught by the alleged prior art reference.

In amended claim 7 (present invention), since the cell adhesion auxiliary portion is formed such that the cells can be bound to each other on the cell adhesion auxiliary portion, the cells on the entire cell culture region can be bounded (page 4, line 27 to page 5, line 4 of the specification). In other words, it is possible to culture cells in the same size area to the area obtained when the cells are cultured on the entire cell culture region (page 10, lines 15-25 of the specification).

In contrast, Singhvi merely states that less than 10 percent of the cells are allowed to bind across the cell-nonbinding region (cytophobic region) (abstract). Accordingly, in the invention of Singhvi, it is impossible to bind cells on entire regions including the cell-binding region and cell-nonbinding region. Further, cells cannot be cultured over the same size area to the area obtained when the cell are cultured on the entire regions including the cell-binding region and the cell-nonbinding region.

Moreover, neither Spargo and Koichi disclose that cells are bound across the cell-nonbinding region and between adjacent cell-binding regions.

PAGE 9/18 * RCVD AT 9/10/2009 4:42:59 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/9 * DNIS:2738300 * CSID:312 427 6663 * DURATION (mm-ss):03-24

In the present invention, the region other than the "cell culture region" is a "non-cell culture region" which inhibits adhesion to cells (page 11, lines 24-27 of the specification). Further, the "cell culture region" comprises the "cell adhesion portion" at which the cell adhesive layer is formed, and the "cell adhesion auxiliary portion" which inhibits adhesion to the cell.

In contrast, Singhvi discloses that a plurality of "cell-binding regions" is located by the "cell-nonbinding regions" (abstract). Nonetheless, unlike the present invention, Singhvi does not state the technical concept that the cell culture patterning substrate comprises the cell culture region which contains the cell adhesion portion and the cell adhesion auxiliary portion, and the cell-nonbinding region.

Further, unlike the present invention, neither Spargo and Koichi state the technical concept that the cell culture patterning substrate comprises the cell culture region which contains the cell adhesion portion and the cell adhesion auxiliary portion, and the cell non-culture region.

In the present invention, the width of the cell adhesion auxiliary portion is in the range of 0.5 μm to 10 μm (page 12, lines 22-25 of the specification).

In contrast, Singhvi mentions the size of the cell-binding region, but it merely illustrated that the width of the cell-nonbinding region is about 50 μm in FIG. 1F. Spargo states that the line-width of the respective cell-binding region and cell-nonbinding region is set within the range of 100 μm to 500 μm (P. 11072, right column, lines 3-7). Koichi states that the width of the cell-binding region is 10 μm (paragraphs [0068] and [0073]). Clearly none of the references disclose the width of the cell adhesion auxiliary portion recited in the present invention.

The Applicant submits, therefore, that claims 7 is not anticipated by Singhvi, Spargo, nor Koichi because none of the references teach each and every element of

PAGE 10/18 * RCVD AT 9/10/2009 4:42:59 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/9 * DNIS:2738300 * CSID:312 427 6663 * DURATION (mm-ss):03-24

claims 7. Claim 8 depends from novel and allowable claim 7, and therefore, has all of the limitations of claim 7. The Applicant respectfully requests that the remarks made over claim 7 be both reflected over dependent claim 8, and also overcome the rejection of claim 8. The Applicant respectfully requests, therefore, that the Examiner withdraw the rejection of claims 7 and 8.

Rejection of Claims 7-11 and 13 under 35 U.S.C. §103(a).

In the Office Action, the Examiner also rejected Claims 7-11 and 13 under 35 U.S.C. §103(a) as obvious over Singhvi.

The Applicant respectfully disagrees and submits that the claims are non-obvious and patentable. As discussed extensively above, the references do not teach, disclose, or suggest all of the limitations of the present invention.

The object of the present invention is to provide a cell culture patterning substrate on which cells can be arranged regularly with high efficiency over a large area so as to attain formation of a tissue, etc (page 3, line 27 to page 4, line 1 of the specification). To attain this object, the cell adhesion auxiliary portion is provided in the cell culture region. That is, the cell adhesion auxiliary portion is formed in such a manner that it will not inhibit the binding of the cells adhered to adjacent cell adhesion portions when the cells are adhered to the cell adhesion portions, and further, the width of the respective cell adhesion portions is within the predetermined range.

On the other hand, all of the Singhvi, Spargo, and Koichi disclose utilizing patterns having different cell adhesion properties to align cells. More specifically, cells are adhered to minute cell-binding region and are aligned only within the cell-binding region (Singhvi: column 2, lines 36-45, column 12, lines 40-45, claim 12; Spargo: FIG. 3; and Koichi: paragraphs [0068] and [0073]).

Accordingly, a person skilled in the art who became aware of Singhvi, Spargo, and Koichi would appropriately form the cell-nonbinding region in such a manner that the cells would not bind across the cell-nonbinding region and between the adjacent cell-binding regions, in order to align the cells. Therefore, a person skilled in the art would not be able to easily anticipate the technical concept of the present invention.

Further, Singhvi discloses that less than 10 percent of the cells are allowed to bind across the cell-nonbinding region and between the adjacent cell-binding regions (abstract). However, even if less than 10 percent of the cells are bound it will be impossible to eventually culture cells in the same area size to the case when cells are cultured in the entire region including the cell-binding region and cell-nonbinding region.

Moreover, it is disclosed in Singhvi that the size of the cell-binding regions is not particularly limited (column 11, lines 45-55). As explained above, however, a person skilled in the art who became aware of Singhvi would appropriately form the cell-binding region in such a manner that the cells would not bind across the cell-nonbinding region and between the adjacent cell-binding regions, in order to align the cells. Therefore, it is natural to widen the cell-nonbinding region, and the skilled person would not anticipate narrowing the width of the cell adhesion auxiliary portion like the present invention.

In addition, the present invention attains the effect that the cells on the entire cell culture region can be finally bound because of the following reasons: the cell adhesion auxiliary portion is formed such that, upon adhesion of cells to the cell adhesion portion, bonding of the cells adhered to the adjacent cell adhesion portions to each other are not prevented; and the width of the cell adhesion portion is within the predetermined range (page 4, line 27 to page 5, line 4; page 10, lines 15-25; and page 11, lines 24-27 of the specification).

PAGE 12/18 * RCVD AT 9/10/2009 4:42:59 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/9 * DNIS:2738300 * CSID:312 427 6663 * DURATION (mm-ss):03-24

Still further, the present invention also attains the following effect: as the cell adhesion portion and the cell adhesion auxiliary portion are formed in the cell culture region, the cells can be submitted at the boundary regions between the cell adhesion portion and the cell adhesion auxiliary portion. Thereby, the cells can be in excellent arrangement and the morphological change can be excellently effected (page 4, lines 20-27, page 9, line 27 to page 10, line 14 of the specification). Thus, even when the cell culture region is a large area, the cell arrangement and morphological change can be made excellent. This effect is also apparent from the results obtained in Example 2 and Comparative Example 2 described in the specification.

These effects are not disclosed or suggested by Singhvi. Nor can these effects be predicted from Singhvi. Clearly, a person of skill in the art would not find that Singhvi teaches or suggests all of the features of claim 7. In fact, neither Spargo nor Koichi cure the deficit found in Singhvi in whole or in combination. The Applicant respectfully submits that claim 7 is non-obvious and requests that the Examiner withdraw this ground of rejection as to claim 7.

It is axiomatic that if an independent claim is allowable, then any claim depending therefrom is also allowable. Since claims 8-10 depend from claim 7, the Applicant respectfully requests that the remarks made over claim 7 be both reflected the dependant claims and also overcome the rejection. The additional elements as are found in these dependant claims serve to further distinguish claims 8 and 9 from the alleged prior art. The Applicant respectfully requests that the -rejection over claims 8-10 also be withdrawn.

The Applicant notes that for the same reasons mentioned above, claims 21 is likewise novel and non-obvious over Singhvi, Spargo and Koichi, in whole or in combination.

Claims 9-11 and 15-16 are also non-obvious for the following reasons presented below.

The Examiner admits that Singhvi is silent with respect to a particular shape, dimension, or pattern of the cell-binding region and cell-nonbinding region (page 7 of the outstanding Office Action). On the other hand, Singhvi does not particularly specify the size, dimension of the cell-binding region, and rectilinear, circular, and ovoid are listed as examples of the shape of the cell-binding region (column 11, lines 45-47). It is further stated that, irrespective of the shape of the cell-binding region, the pattern of the cell-binding region is preferably a grid pattern (column 11, lines 53-55). From these disclosures, the Examiner states that it is obvious that the shape of the boundary between the cell-binding region and the cell-nonbinding region is concavoconvex shape (page 7 of the outstanding Office Action).

However, even if Singhvi discloses that the cell-binding region can take any shape, the skilled person would not easily anticipate the shape of the boundary between the cell-binding region and the cell-nonbinding region as concavoconvex shape.

In fact, although Singhvi states that the cell-binding region can be of any shape, there is no disclosure or suggestion regarding the shape of the boundary between the cell-binding region and the cell-nonbinding region. The skilled person would not come up with the idea to set the shape of the boundary between the cell-binding region and the cell-nonbinding region to the specific shape.

Moreover, the pattern of the cell-binding region is formed by using the stamp in Singhvi (FIGS. 1A to 1F). In manufacturing this stamp, it is difficult to, for example, make a side of the square to a concavoconvex shape. Even if a side of the square pattern is made into a concavoconvex shape, it is difficult to transfer the

concavoconvex shape precisely in transferring the stamp to the base material surface. Accordingly, a motivation to make a side of the square pattern to a concavoconvex shape despite its difficulties cannot be found from Singhvi.

Still further, the present invention attains another effect: by the boundary between the cell adhesion auxiliary portion and the cell adhesion portion being a concavoconvex shape in a planar view, or, by the boundary between the cell culture region and the non-cell culture region being a concavoconvex shape in a planar view, the cells can receive more stimulation from the boundary regions so that the cells can be further regularly arranged (page 5, lines 10-18; page 5, line 25 to page 6, line 1; page 14, lines 1-7; and page 68, line 19 to page 69, line 1 of the specification). This effect is also apparent from Example 1 and Comparative Example 1. Nowhere is such an effect taught, disclosed, or suggested by the Singhvi disclosure.

Therefore, the present invention as claimed in claims 9-10, 11, and new claims 15-16 is not obvious over Singhvi, and also in view of Spago and Koichi, in whole or in combination.

Regarding new claims 17-20, the cell adhesive layer contains a cell adhesive material which has cell adhesive properties and is capable of being decomposed of denatured by the action of a photocatalyst upon irradiation with energy, and the cell adhesion auxiliary portion or the non-cell culture region contains a cell adhesion-inhibiting material which has cell adhesion-inhibiting properties and is capable of being decomposed or denatured by the action of a photocatalyst upon irradiation with energy (page 6, lines 1-6, lines 17-25; and page 19, lines 8-18 of the specification).

PAGE 15/18 * RCVD AT 9/10/2009 4:42:59 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/9 * DNIS:2738300 * CSID:312 427 6663 * DURATION (mm-ss):03-24

In contrast, in Singhvi, the cell-binding region and the cell-nonbinding region are formed by using a transfer method and a self-assembled monolyer (SAM) (FIGS. 1A to 1J).

Further, in Spargo and Koichi, the cell binding region and the cell-nonbinding region are formed using the hydrophobic/hydrophilic region, but they do not utilize the action of a photocatalyst upon irradiation with energy.

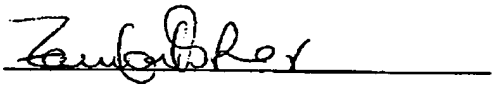
Therefore, the material used in the present invention, which is decomposed or denatured by the action of a photocatalyst upon irradiation with energy, is not taught in any of the references.

In view of the above, the present invention as claimed in new claims 17-20 is also not taught in Singhvi, Spargo, and Koichi, and not obvious over Singhvi, Spargo, or Koichi.

CONCLUSION

The Applicant believes that this Amendment is responsive to all points raised in the Office Action dated March 20, 2009. The Applicant respectfully contends that all conditions of patentability are met in the pending claims and requests that the amendments be entered into the record. The Applicant respectfully submits that this Application should be in condition for allowance and respectfully requests favorable consideration.

Respectfully Submitted,



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PAGE 16/18 * RCVD AT 9/10/2009 4:42:59 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/9 * DNIS:2738300 * CSID:312 427 6663 * DURATION (mm-ss):03-24

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PAGE 17/18 * RCVD AT 9/10/2009 4:42:59 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/9 * DNIS:2738300 * CSID:312 427 6663 * DURATION (mm-ss):03-24